DaimlerChrysler AG

Interior lamp, especially for a vehicle

The invention relates to an interior lamp in accordance with the features of claim 1 which form the generic type.

A generic interior lamp is known, for example, from the E class Mercedes-Benz. An interior lamp is arranged in the roof-operating unit and has, as the normal illuminating function, an incandescent bulb whose light is diffused by a conventional diffuser screen into the vehicle interior. As an additional lamp, an ambient lamp is provided as the second lamp which comprises a curved optical waveguide into which the light from a light-emitting diode is introduced laterally. This light is guided through the optical waveguide and passes to the outside as ambient light at the interference points over the entire area of the optical waveguide.

DE 100 32 927 A1 and DE 101 49 044 A1 disclose an illumination device for the purpose of illuminating the interior of a motor vehicle. The illumination device has at least one luminous means and at least one plate-like or rod-like optical waveguide which is arranged with its light injection area in the light irradiation region of the luminous means. The optical waveguide has a plurality of light output points which are spaced apart from the light injection area. In at least one beam path, which extends from the light injection area to one of the light output points, the optical waveguide has at least one reduction point, which is spaced apart from the light output point, which forms a shield, and which is arranged and/or formed such that the light intensity of the light emerging at the individual light output points is damped to differing

degrees.

The reduction point is provided with a light-impermeable cover at least on the light output side of the optical waveguide.

One disadvantage is the fact that the two lamps require a lot of physical space in the roof-operating part. On the one hand, the normal interior illumination and then also the ambient illumination which is arranged on the right and left in the roof-operating part and which surrounds the roof-operating unit in the form of a ring of light.

The object of the invention is therefore to arrange an interior lamp, which combines various illuminating functions, in a small amount of physical space.

In the drawing:

figure 1 shows a roof-operating part with interior illumination,

figure 2 shows a schematic sectional illustration of an interior lamp having a normal and an ambient light function, and

figure 3 shows a schematic sectional illustration of an interior lamp having a normal light function with an integrated reading lamp and an ambient light function.

Figure 1 shows a roof-operating part 1, which has a region having operating elements 3 for the purpose of operating the interior illumination and an interior lamp 2. This interior lamp 2 has a normal and an ambient light function. The normal light function has, as the normal interior illumination 2, a diffusing screen 12 as a cover which diffuses the light from the incandescent bulb 11, which is arranged below the diffusing screen 12, to the outside. The diffusing

screen 12 is an optical waveguide 4. Light is injected into this optical waveguide 4 laterally by a light-emitting diode 6, propagates along the optical waveguide 6 and is output as ambient light at interference points 9 provided for this purpose in the optical waveguide 6. The surface structure may have, for example, a regular or irregular roughness which deviates from a smooth surface, microprisms, grooves, a varnish or similar optical interference, at which total reflection of the light guided in the optical waveguide 6 does not occur or only occurs to a limited extent, and the light is thus output from the optical waveguide 6. The ambient light function 6 is only active if the normal light function 11 is switched off. The normal light function 11 is only active when the ambient light function 6 is switched off. The different light functions 6, 11 can be switched on by means of an operating element provided for this purpose. However, they can also be switched on automatically, for example during the day the normal interior illumination 2 is connected when the doors are opened, whereas the ambient illuminating function 4 is activated by means of a light or rain sensor or when the headlights are switched on.

Figure 2 shows a schematic sectional illustration of an interior lamp 2 having a normal 2 and an ambient light function 4. The normal light function 2 is in the form of an incandescent lamp 11, whose light is directed by a reflector 7 in the direction of the diffusing screen 12. Diffusing points 8 are arranged on the inside of this diffusing screen 12 and diffuse the light into the interior in all directions. These diffusing points 8 are usually arranged on the inside of the diffusing screen 12 such that the interior lamp 2 has a smooth surface, as is desired from the design. Technically, the diffusing points 8 may, however, also be located on the surface of the diffusing screen 12 and diffuse the

light into the interior of the vehicle only when light has passed through the diffusing screen 12. The normal 2 and the ambient light function 4 are switched on independently of one another. The ambient illumination 6 is switched off when the normal light function 11 is activated, and the normal light function 11 is switched off in the case of the ambient light function 6. A light-emitting diode 6 is activated for the ambient light function 4, the light from said light-emitting diode 6 passing into the optical waveguide 12, which acts as a diffusing screen 12 in the case of the normal light function 2. This light is injected into the optical waveguide from below at the injection point a into the optical waveguide. However, the light may also be injected laterally or from above. This depends on the direction in which the injection point a is formed. This light is guided in the optical waveguide 12 from its point of entry a up to the other end of the optical waveguide n. However, a plurality of injection points a to n are also arranged for the light. The light may in this case be introduced into the optical waveguide at a, b and/or n. A mirror may also be arranged at the injection point n, with the result that the light is passed back again to the point of entry a. As the light passes through the optical waveguide 6, it is diffused into the interior at diffusing points 9 provided in the optical waveguide 12. The interference point 9 may be arranged at the surface of the optical waveguide 12, and may have a regular or irregular roughness which deviates from a smooth surface, microprisms, grooves and/or a varnish or a similar coating, at which total reflection of the light guided in the optical waveguide 6 does not occur or occurs only to a limited extent. The interference point 9, however, is preferably arranged in the interior of the optical waveguide 12 and is formed, for example, by diffusers and microparticles found there or by points at which the optical waveguide resistance is increased in comparison

to a region adjacent thereto. The at least one interference point 9 thus represents a control element which makes it possible for the design engineer, by correspondingly arranging and/or forming the interference points 9, to match the light distribution at the light output area of the optical waveguide 12 to a light distribution which is desired for the respective illumination task. In this case, it is particularly possible for the interference points 9 to be arranged and/or formed such that at the light output area of the optical waveguide 12 to be matched to a light distribution which is desired for the respective illumination task. In this case, it is particularly possible for the interference points 8 to be arranged and/or formed such that a light output or light intensity distribution achieved at the light output area of the optical waveguide 12 is uniform to the human eye. The light diffused by the interference points 8 into the interior lamp 2 is diffused by the reflector 7 back to the optical waveguide 12 and passes from there into the interior of the vehicle in the same way as the normal light function 2. This reflector 7 brings about increased luminous efficiency of the ambient light function 4 owing to the back-reflection of the light. The optical waveguide 12 is preferably made of transparent plastic such that it is flexible and allows the light emitted in the case of the normal illuminating function 2 to pass directly into the interior. In order to diffuse the light uniformly into the vehicle interior, the inside of the diffusing screen 12 is fluted. These fluted formations then form the diffusing points 8 for the purpose of diffusing the light into the vehicle interior. The flexibility of the optical waveguide 4 means that the diffusing screen 12 can be adapted to any desired surface, with the result that there are no limits to the design as regards its arrangement and configuration. It is thus also possible for the interference points 8 to assume the function of

the interference points 9 if an optical waveguide is used which has this property of outputting the light from the optical waveguide at these interference points 8.

The interior lamp 2 having a normal illuminating function 2 and an ambient illuminating function 4 for the purpose of providing ambient illumination for the interior may also be realized by means of OLED technology. OLEDs are transparent plastic disks which emit light themselves when a voltage is applied. In this case, an incandescent lamp 11 is provided for the normal illuminating function 2, and this lamp 11 radiates through a disk arranged as a diffusing screen 12, and the disk 12 emits light itself for the ambient illuminating function by a voltage being applied.

In figure 3, a reading lamp 5 is arranged below the optical waveguide 6, which is in the form of a diffusing screen 12, in addition to the normal interior lamp 2. This reading lamp 5 in this case has a dedicated luminous means 11a. Alternatively, the part of the diffusing screen 12 which is associated with the reading lamp 5 has different diffusing points or interference points 10 than the part associated with the normal interior lamp 2, with the result that the light from the reading lamp source 11a is diffused into the vehicle interior in a more directed fashion, owing to the interference points 10 on the diffusing screen 12, so as to provide a good reading light. The interference points 8, 9 are formed such that the light output points, which are preferably connected to one another to form a continuous light output area, have essentially the same light intensity.